

**Measurement Amplifier**

***VMF 2000***



## **Operating Instructions**

(Measurement Transducer Adjustment)

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*Subject to change without prior notice*

## Intended use of this product

This measurement amplifier may be used only to process signals of Vollmer measurement transducers as intended by the Vollmer company in this individual application. It must be firmly installed in its intended position and electrically and electronically connected as intended by the Vollmer company. Any alteration might cause severe damage.

## Safety Precautions, read carefully!

This manual has to be handed to the machine operator, and one copy must be permanently available to operator and service personnel.

Nobody is allowed to work on or with the gauge, before he has read and understood this manual. Feel free to call the Vollmer company in case of any questions (phone +49 2334 507 0).

Check if the main power supply voltage is in the range indicated on the label on the rear side of the product. Never connect the product to any power supply which has another voltage than indicated on the label.

Do not operate this product in explosion hazardous areas.

Disconnect the product from main power before opening any cover. Replace defective fuses only with absolutely identical fuses (consider current values as well as type).

Protect yourself against electric shock. Do not change any connection in the product and never touch live components.

Do not perform any manipulations on this product not described in this manual. Wrong handling might cause hazards for the user, and it terminates the instrument warranty period.

This product may only be used if it is in a technically perfect condition. Any changes or defects which might affect the safety must be eliminated before the product is put into operation.

Expose this product only to such environmental conditions as it is designed for. Stick to the notes in the technical documentation. This product is not designed for use in wet environments.

Never operate this product if any cover is open.

Before putting this product into operation and regularly during operation, check this product for damage. Defects of all kinds must be eliminated at once by authorized service personnel. The use of original spare parts and of additions from the manufacturer reduce the security hazard.

Check all connections regularly and replace defective parts immediately.



## General

Any Vollmer gauge using two LVDT transducers measuring in sum, requires a regular check of transducer symmetry. If new electronic transducer parts or an entirely new transducer has been installed into the gauge, the transducer requires complete sensitivity and symmetry adjustment.

The amplifier VMF 2000 provides almost entirely automatic adjustment settings, so that measurement accuracy may be quickly checked at any time.

### Notes !

*All transducers have 5-pin Cannon connectors.*

*Extension cables for transducers of the series /0 have a 5-pin Tuchel connector at the VMF end.*

*Extension cables for transducers of the series /90, /92 and /02 have a 6-pin Tuchel connector at the VMF end.*

Adjustment of the VMF 2000 to LVDT transducers of the series /02, /90 and /92 requires a .070" (1800  $\mu$ m) gauge block.

Transducers of the series /90 and /92 have a measurement stroke of 2 mm, and they can be recognized by their extended coil holder of stainless steel. Their extension cables have a 6-pin-Tuchel connector at the VMF end.

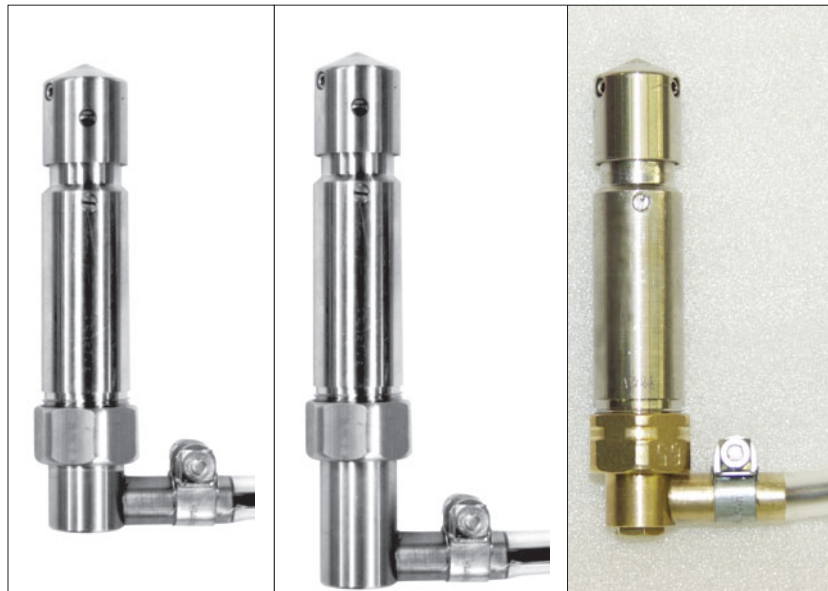
Transducers of the series /02 have a measurement stroke of -2,3/+2,1mm (.080" resp .090"), and they can be recognized by the notch in their coil holder's cap nut. Their extension cables as well have a 6-pin-Tuchel connector at the VMF end .

For the adjustment of series /0 transducers (1 mm measurement stroke, brass coil holder, cap nut without notch), .030" (800  $\mu$ m) gauge block is required.

The type of transducers in your gauge is specified on the Gauge Card in your technical documentation. Some gauges measuring under tight toler-

### Notes for transducers of the series /02

*Series /02 transducers come with a linearization curve, which needs to read into the VMF before the adjustment to the transducer can start. The procedure is described in the transducer service manual. The curve needs to be read in anew when a new transducer or a new VMF is installed into the system. The VMF needs to run under the software version 3.30 or newer.*



**Transducer series /0,  
Stroke  $\pm 1$ mm:**

*Coil holder made of brass, (short or long), normal cap nut, adjustment by the setting of symmetry and sensitivity*

**Transducer ser. /90 + 92  
Stroke  $\pm 2$ mm:**

*Long coil holder made of stainless steel, normal cap nut, adjustment by the setting of cable length, symmetry and sensitivity*

**Transducer series /02,  
Stroke -2,3/+2,1mm:**

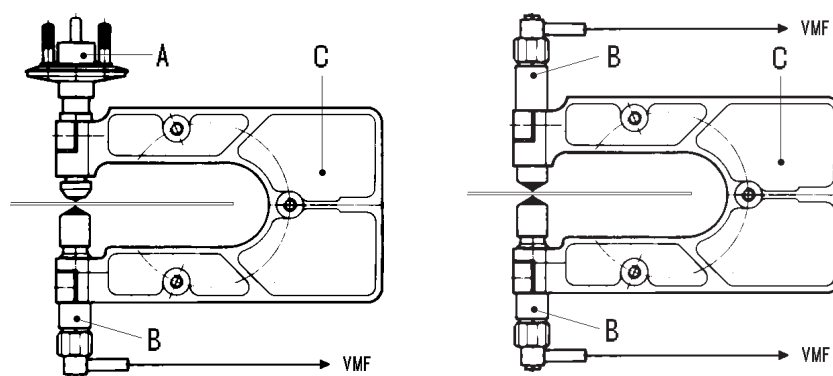
*short coil holder made from brass, notch in cap nut, adjustment by linearization curve, setting of cable length, symmetry and sensitivity.*

ances might use other gauge blocks. They were set at the factory and are stored under "G.Block 2" in the memory of the VMF 2000.

### Sum/Single Measurement

Sum measurement means, that two LVDT transducers, installed in a C-shaped measurement frame are measuring e.g. a strip simultaneously from the top and from the bottom side. This provides high accuracy measurements even on vibrating strip.

Single measurement means, that only one LVDT transducer is installed in the C-frame. The other side is supplied with an adjustable fine adjustment micrometer.



*Single transducer measurement (left) and sum measurement (right): Either one transducer (B) measures against a micrometer fine adjustment (A) or two transducers are installed in the measurement frame (C).*

The difference is obvious: With sum measurement two transducer signals are added in the VMF amplifier, while single transducer measurement generates only one signal.

Symmetry adjustment eliminates the linearity differences of the two transducers.

Sensitivity adjustment is the procedure used to set the input signal level of the transducers into the VMF amplifier. This adjustment compensates for the tolerances of the electronic components, so that the transducer signal is linear along the entire measurement stroke.



## Commissioning

### Safety precautions !



*Check, if the voltage selector is correctly set to the voltage of the main power before connecting the VMF to mains.*

*Connecting the VMF to a wrong main power voltage may damage the instrument and may expose the operator to an electric shock. Danger !*

*Disconnect mains before opening the VMF! Danger to life!*

Above the main power connector is a small plastic rack. When the plug is pulled off the connector, use a small screwdriver to open the rack at the top (see arrow) and flip it down. The take out the small "roll" inside and turn it into such a position, that the correct voltage (in the photo it is 220 VAC) is pointing to the outside. Close the rack again.

After checking of the main power voltage setting, insert all connectors and fasten them properly to the sockets in the amplifier.

Switch on the amplifier at the mains switch 0/I.



The digital display will indicate the following messages:

the amplifier type	" VMF 2000 "
the software version, e.g..	" Rev. 3.46 "
and	" Check "

The VMF 2000 performs an internal self check during the start-up and after a few seconds it is operational. The display indicates S 0.0 on the left. Digital and analog indicator show the current measurement value.

### To replace a fuse

Pull off the main power connector. Open the small rack mentioned above and flip it down. Now two fuses are visible. The left one is a spare, the right one is in operation. Replace defective fuses only by fuses of the same type (5 x 20 mm, 630 mA T=slow).

## Select analogue indicator sensitivity

The two keys ▲ and ▼ are used to indicate and to select the range of the analogue indicator needle. The digital indication remains unchanged. The two keys step through the available ranges in microns or inches as written below:

±	10000 µm	±	0.3	"
±	3000 µm	±	0.1	"
±	1000 µm	±	0.03	"
±	300 µm	±	0.01	"
±	100 µm	±	0.003	"
±	30 µm	±	0.001	"
±	10 µm	±	0.0003	"


In the 300 µm range, a fully deflected needle indicates a deviation of 300µm. If 10µm is selected, a fully deflected needle indicates a deviation of 10µm. The result can be easily read from the 3 scale or from the 10 scale depending on the selected range.


Example 1: selected range ±30 µm, measured deviation +15 µm:  
indicator needle is between +1 and +2 on the 3 scale

Example 2: selected range ± .001", measured deviation - .0005":  
indicator needle is on -5 on the 10 scale

## Zero setting

- set nominal size thumb wheel switch (if there is one) to zero; systems without nominal size thumb wheel switch are set to zero mechanically by setting the transducer to zero on its mechanical counter, scale ring, or nominal size digital indicator. Press the "Nom. Size Read In" pushbutton.
- check VMF indication:

eliminate minor deviations from zero by pressing  followed by F1

if there are considerable deviations  $> 100 \mu\text{m}$ , then check the gauge for correct symmetry. Then adjust the transducers until the VMF indicates near zero, then adjust the (digital or mechanical) counter or the scale ring to zero (without altering the position of the transducer); finally press  followed by F1 to set the amplifier to zero.

## Nominal size selection

A nominal size selector (optional, see photograph below) compensates the signal of the measurement transducer in such a way, that the selected nominal size is shown as a "0". The nominal size is selected in .00001 or microns

and then digitally transferred to the VMF by pressing the button "Nom. Size Read In".

- set thumb wheel selector to nominal size

- press button "Nom. Size Read In" to transfer the nominal value to the VMF

If the nominal size is e.g. .030" (800  $\mu\text{m}$ ), a .030" (800  $\mu\text{m}$ ) thick strip will be indicated as zero, but if it is .0302" (802  $\mu\text{m}$ ) thick, the measurement result will be +0.00020" (+2  $\mu\text{m}$ ).




*VMF with main switch, thumb wheel nominal size selector and push-button for nominal value transfer.*

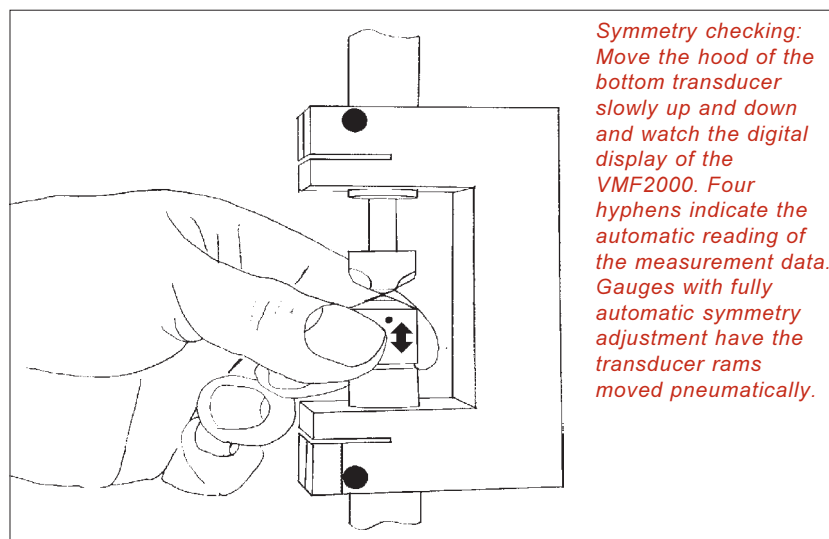


## Symmetry adjustment

Transducer symmetry should be checked regularly.

### Semiautomatic symmetry adjustment

- Set nominal size to zero and read in nominal size, resp. adjust transducer by motor to nominal size
- Press CONFIG on the rear panel of the VMF amplifier
- Use F1 or F2 to step through the menu to "Symmetry"
- Press  , "sym" appears
- Move the tip of the bottom transducer slowly up and down the entire stroke (see below), at each limit stop hold on for about one second
- Four hyphens appear in the VMF display bottom right, then "OK !" appears and the VMF is automatically switched back to measuring mode
- Symmetry adjustment is finished (sensitivity adjustment is now required).



### Fully automatic symmetry adjustment

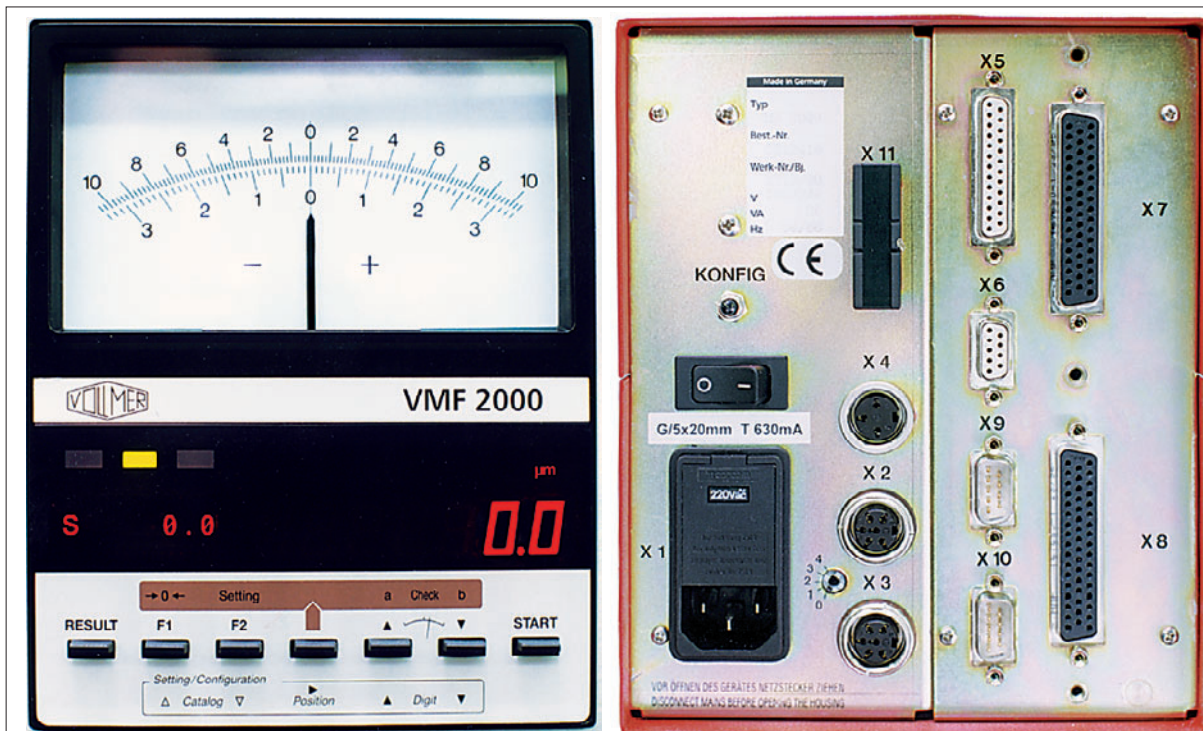
A number of Vollmer gauges, which are operated via a Vollmer PLC, have a pneumatic system for fully automatic symmetry adjustment (Option AS). The principle is the same as with semiautomatic symmetry adjustment, only there is no need to move the transducer tips manually as this is done pneumatically. This allows symmetry checking by a single operator.

Start the automatic symmetry adjustment while the gauge is in its rear limit position and set it to zero (happens automatically with most of the Vollmer systems). Then switch the gauge to the 'Service' mode' (if available). The 'Service I/O' switch is only installed on gauge systems which have a slidebase on which they are traversed pneumatically or hydrauli-

cally. Start the pneumatic operation of the transducer rams by switching 'sym' to 'on'. Both switches are inside the pneumatic or the electronic cabinet. This function can also be called up via the OP77 control unit.

## Note

*The sensitivity must be adjusted after the symmetry adjustment.*



Front of the VMF 2000: Analogue indicator for the measured deviation, digital indicator for the absolute value; dual key functions, selectable with the center key.

Rear panel of the VMF 2000: Transducer inputs X2 and X3, CONFIG(uration) button and interfaces for PC, printer/recorder and remote control.

## Sensitivity check / adjustment

In order to ensure correct calibration, sensitivity should be checked regularly and after any service on the gauge system. The settings for "G.Block 1" and "G.Block 2" remain stored after saving (see below), that means they require new adjustment only when the values are changed.

### Note

*Sensitivity adjustment is required as absolute necessity only on applications that utilize electronic nominal setting, i.e. for such transducers which are not mechanically set to nominal size.*

*On gauges with mechanical nominal size setting, the analog indicator will indicate correctly with sensitivity adjustment as well as without it. The digital thickness indication however, may indicate different results if the sensitivity is not set correctly. Therefore, in order to avoid misinterpretation, it is recommended to adjust the sensitivity regardless of the way of nominal size adjustment.*

Sensitivity adjustment step by step:

- press CONFIG on the rear panel of the VMF amplifier to get into the menu
- press F1 or F2 to step through the menu to "G.Block"
- press  $\blacksquare$  "G.Block 1" appears; if value is not zero, then press key  $\blacksquare$  to select one digit after the other, and use  $\blacktriangle$  or  $\blacktriangledown$  to set figures to zero
- press F2; "G.Block 2" appears; set to .06000" (or 1800 $\mu$ m) for transducers of the types /02, /90 and /92 (set to .03000" or 800  $\mu$ m for transducer types -0)
- press F1, "G.Block" appears
- press F2, "sensitivity" appears
- press once  $\blacksquare$ , "G.Block 1" and 0.00000 appears
- press  $\blacksquare$  for a second time, a row of dots appears bottom right in the display; then "G.Block 2" appears
- now insert a slip gauge block of the size of "G.Block 2" .06000" (or 1800 $\mu$ m) resp. .03000" (or 800  $\mu$ m) between the transducer tips
- press  $\blacksquare$  for the third time; a row of dots appears bottom right in the display and the amplifier then automatically switches back to the measurement mode
- remove the gauge block from the gauge
- normally the zero point will not be correct as the stored zero is eliminated during the sensitivity procedure. Zero the value by pressing  $\blacksquare$  and then F1)
- sensitivity adjustment is then finished







## Lock and unlock menu / Save configuration


In order to save the new setup values permanently when the amplifier is switched off, it is recommended, first to lock the menu and then to save the new configuration (settings)

Due to the lock, the amplifier settings cannot be erased or altered accidentally or by unauthorized persons.



The saving stores the configuration permanently after power off and in case of a power breakdown.

### Lock menu and save configuration (step by step):

- press CONFIG on the rear panel of the amplifier in order to enter the menu
- use F1 or F2 to flip through the menu to "Lock off"
- press , CODE 0000 appears
- use  or  to set figures 1 through 9 for the selected digit, press key  to toggle between the four digits
- after the four numbers were entered, press F1, "Block.?  appears
- press  to confirm locking
- > 0 <- appears. This feature allows to deactivate the manual zero setting. This is recommended for gauges with A0 or with stepper motor control.

If you want to allow manual zero setting, do not confirm with  but use F1 or F2 to flip through the menu towards "Save"







Or press  to deactivate manual zero setting

- press F1 or F2 to flip through the menu towards "Save"
- press , "yes" appears
- press  to confirm, the display shows "yes" and finally "save"
- press "result", to quit the CONFIG mode
- "S 0.0" indicates that the amplifier has saved the new configuration permanently and has the switched back to measuring mode

### Note !

*If the code for unlocking was lost, call the Vollmer company to get a main code which allows to unlock the menu despite of the lost code.*

### Unlock menu (step by step):

- press CONFIG on the rear panel of the amplifier in order to enter the menu
- use F1 or F2 to flip through the menu to "Lock"
- press , CODE 0000 appears
- use  or  to set the figure for the first digit, press key  to get to the following digit, use  or  to set the correct figures
- after the four numbers were entered, the menu is unlocked; use F1 or F2 to flip through the menu towards the selected option

## Tolerance setting

VMF 2000 amplifiers have an integrated classifier. The menu options "upper Tol." and "lower Tol." are only available if the configuration parameter "Tol" is set to "on". This is indicated by the symbol  $\rightarrow I \leftarrow$ .

If "Tol. off" is set, the options "upper Tol." and "lower Tol" do not appear in the menu.

Key	Action
■	press 1 x
F2	press several times until 'up TOL' (upper tolerance limit) is indicated
■	press 1 x > PLUS or MINUS sign flashing
▲ or ▼	press to change sign to PLUS
■	press 1 x > first digit is flashing
▲ or ▼	press to set 1. digit
■	press 1 x > second digit is flashing
etc.	

After the last digit of the upper tolerance limit was set, continue with the lower tolerance limit:

F2	press several times until 'low TOL' (lower tolerance limit) is indicated
■	press 1 x > indication is flashing
■	press 1 x > PLUS or MINUS sign is flashing
▲ or ▼	press to change sign to MINUS
■	press 1 x > first digit is flashing
▲ or ▼	press to set 1. digit
■	press 1 x > second digit is flashing
etc.	

When both tolerances are set to the selected value, press the RESULT key in order to read-in the new values and simultaneously to switch back the amplifier to standard operation mode

If the measurement value exceeds a tolerance limit, the following markers light up (example for strip thickness measurement as standard application)

**yellow:** too thick      **green:** in tolerance **red:** too thin

The new tolerance limits will be erased when the amplifier is switched off. This is because the original tolerance limits in the amplifier are stored for safety reasons. When the amplifier is switched on, the old values will come up again.

However, the new tolerance limits remain stored if the new configuration is saved before the amplifier is switched off.

## Adjustment to individual extension cable length

### Note !

*This adjustment is only available for transducers with a stroke of  $\pm 2$  mm (series /90 and /92) and  $-2,3/+2,1$  mm (series /02).. Such transducers and their extension cables have 6-pin Tuchel connectors.*

*The extension cables of transducers with a stroke of  $\pm 1$  mm (series ../0) have 5-pin Tuchel connectors at the VMF end, they do not use the pin, which is connected to the length selector switch. The cable length selector switch is not utilized for such transducers, therefore it is set to zero.*

*Swap, replace, elongate or shorten cable only after having discussed this with Vollmer.*

Cable length can be set by the small selector switch beside socket X3 on the rear panel of the VMF amplifier:

Extension cable length up to 15 m	>	setting 0
Extension cable length 15 m	>	setting 1
Extension cable length over 15 m	>	setting 2
Extension cable length over 35 m	>	setting 3
Extension cable length over 45 m	>	setting 4



*Selector switch for setting the length of the extension cables between amplifier and measurement transducers.*